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And is not this a theatre vast enough for ambition? Yet, the “*Non omnis moriar*” feeling, the dread of annihilation, will recur, — the fond hope, that the thought now fluttering into being, shall find its way down, and mingle with the souls of the good and the wise of future generations. It is impossible to predict what may be the fate of a writer with this same Posterity. Or rather, it is very possible to predict, with the comfortable assurance, that such prediction cannot be discredited in our own day. We cannot but think, that Jupiter will listen to one half of our author’s prayer, should he give the other to the winds; and that there are poems in this collection, of too much excellence for “after-times” (to quote again the words of the blind old bard) to “willingly let die.”

- ART. V. — 1. *Traité complet sur le Sucre Européen de Betteraves, Traduction abrégée de M. ACHARD; par M. D. ANGAR. Précédé d’une Introduction et accompagné de Notes et Observations; par CH. DEROSNE.* Paris, 1812.
2. *Mémoires sur le Sucre de Betteraves; par M. le Comte CHAPTAL.* 3^e édit. Paris, 1822.
3. *Traité complet de la Fabrication du Sucre de Betteraves,* par DUBRUNFAUT. Paris, 1825.
4. *Faits et Observations sur la Fabrication du Sucre de Betteraves, et sur la Distillation des Mèlasses; par C. J. A. MATHIEU DE DOMBASLE.*
5. *Traité de la Fabrication et du Raffinage des Sucres de Cannes et de Betteraves; par M. PAYEN.* Paris, 1832.
6. *Notice sur la Fabrication du Noir Animal; par J. S. CLÉMONDAT.* Paris, 1832.
7. *Bulletin du Procédé de Macération pour la Fabrication du Sucre de Betteraves; par C. J. A. MATHIEU DE DOMBASLE.* Paris, 1832.
8. *Manuel du Fabricant et du Raffineur de Sucre de Cannes et de Betteraves; par MM. BLANCHETTE et ZOEGA.* 2^e édit., augmentée et enrichie de Planches; par M. JULIA DE FONTENELLE. Paris, 1833.
9. *Rapport fait au Nom de la Commission, chargée d’ex-*

amener le Projet de Loi sur les Sucres ; par M. DUMON, Député de Lot-et-Garonne. Séance du 8 Mai, 1837.

10. *Manual of the Art of Making and Refining Sugar from Beets, Translated from Portions of the Treatise of* MM. BLANCHETTE and ZOEGA. Boston, 1836.
11. *Notice of the Beet Sugar, translated from the Works of* DUBRUNFAUT, DE DOMBASLE, and OTHERS. Northampton, 1837.
12. *Cane Sugar and Beet Sugar* ; EDINBURGH REVIEW, April, 1837, Art. V.
13. *Mulberry and Beet Sugar* ; Report of the COMMITTEE ON AGRICULTURE of the HOUSE OF REPRESENTATIVES OF THE UNITED STATES ; April 20th, 1838.
14. *Report and Bill to Encourage the Manufacture of Indigenous Sugar.* By a COMMITTEE of the HOUSE OF REPRESENTATIVES OF MASSACHUSETTS, May 20th, 1837.

WITHIN the present century has commenced a revolution, which may prove to be of very different importance from what has yet generally been supposed, in respect to a leading article in the commerce and domestic economy of civilized men. It has now arrived at a stage, at which it furnishes some *data* for answering the questions, how far it is likely to proceed, and what are to be its permanent effects upon the employment, subsistence, comfort, and wealth of nations.

The commercial and economical importance of sugar is of modern date. It was known to the Greeks and Romans, as a medicinal substance, but not as food or a condiment. Herodotus informs us, that the Zygantes, a people of Africa, had, "besides honey of bees, a much greater quantity made by men." This was probably sugar, but not brought to a state of crystallization. Nearchus, the admiral of Alexander, "discovered concerning canes, that they make honey without bees." Megasthenes, quoted by Strabo, speaks, 300 B. C., of "India stone, sweeter than figs and honey." Theophrastus, in a fragment preserved by Photius, describes sugar as "a honey contained in reeds." Eratosthenes, also cited by Strabo, and after him, Terentius Varro, are supposed to have meant sugar-canes by "roots of large reeds growing in

India, sweet to the taste, both when raw and when boiled, and affording, by pressure, a juice incomparably sweeter than honey."

Near the commencement of the Christian era, sugar was first mentioned under an appropriate name and form. "In India and Arabia Felix," writes Dioscorides, "a kind of concrete honey is called *saccharon*. It is found in reeds, and resembles salt in solidity, and in friableness betwixt the teeth." After this, so learned a man as Seneca fell back into fable on this subject. His account is this; "It is said that in India honey is found on the leaves of reeds, either deposited there by the dews of heaven, or generated in the sweet juice and fatness of the reed itself." Pliny, whose special study led him to look more carefully into the matter, gives all that the ancients knew about it, and a little more. "Arabia," he observes, "produces *saccharum*, but not so good as India. It is a honey, collected on reeds, like the gums. It is white, crumbles in the teeth, and when largest is of the size of a hazel-nut. It is used in medicine only." Afterwards Archigenes mentioned it, as "India salt, resembling common salt in color and consistency, but, in taste and flavor, honey." Galen calls it *sacchar*, and says it was "a production of India and Arabia the Blest." The author of the "Periplus of the Erythræan Sea" includes it, under the name of *sacchari*, in a list of articles, constituting the commerce between hither India, and the ports of that sea.

If the assertion, that sugar was used in antiquity as a medicament only, needed confirmation, we might find it in the fact, that the subject is not mentioned except by physicians and men of universal learning, nor with tolerable precision except by the former. None of them allude to any artificial process in the preparation of it. Ælian, about the middle of the second century, is the first who mentions the use of mechanical art in the extraction of the juice of the cane, and he is likewise the first who attempts to fix the seat of its culture. He tells us, that sugar is "honey pressed from reeds, which are cultivated by the Prasii, a people dwelling near the mouth of the Ganges."

The Jewish histories make no mention of sugar. The only sweet condiment, used by the Hebrews, was honey. But it may have been in part "honey made by men"; for

the Rabbins understand thereby not only the honey of bees, but also sirops, made from the fruit of the palm-tree.

During several centuries succeeding the Augustan age, no extension of the knowledge or use of sugar appears to have taken place. It is occasionally spoken of, but to the same effect as by the Greek physicians of that age. So late as the seventh century, Paul of Ægina calls it "India salt," and borrows the description of Archigenes.

At this time a new power appeared on the theatre of nations. The Saracens conquered and occupied western Asia, northern Africa, and southern Europe. Their empire was scarcely inferior to that of Rome, in the period of her greatest prosperity and rapacity. They pushed their conquests to the Garonne and the Rhone, to Amalfi, and the islands of the Levant and the Ægean sea.

To these ingenious barbarians the world is indebted for the modern manufacture and commerce of sugar. It is not known at what time they themselves became acquainted with it. Some authors have asserted, that it was not until the thirteenth century, and that the sugar-cane and the art of extracting and elaborating the juice were conferred upon the Europeans by the crusaders, or by the merchant adventurers, who penetrated the Indies after the return of Marco Polo. Each of these assertions has been vaguely received; but a little attention will satisfy every inquirer, that neither of them is true.

We have seen, that several of the ancients, best acquainted with the subject, couple Arabia Felix with India as a source of *saccharum*. Arabian writers of the ninth and tenth centuries speak of sugar as common in their times. In the year 906, the sugar-cane was cultivated, and sugar manufactured, at Ormuz in Caramania, a province of the eastern Caliphate. An Arabian author of the western Caliphate, who composed a treatise on agriculture about the year 1140, and who quotes another writer of his nation of the year 1073, gives full and precise directions for raising canes and manufacturing sugar. From all which Loudon concludes, that sugar has been cultivated in Spain upwards of seven hundred years, and probably as much as one thousand years. Salmasius declares, in 1660, that the Arabs had made our modern sugar more than eight hundred years.

One of the Christian historians of the Crusades, in the year

1100, states, that the soldiers of the Cross found in Syria certain reeds, called *canamèles*, of which it was reported, that a kind of wild honey was made." Another, in 1108, says ; " The crusaders found honey-reeds, in great quantity, in the meadows of Tripoli, in Syria, which reeds were called *sucra*. These they sucked, and were much pleased with the taste thereof, and could scarcely be satisfied with it. This plant is cultivated with great labor of the husbandman every year. At the time of the harvest they bruise it, when ripe, in mortars, and set by the strained juice in vessels until it is concreted in the form of snow or salt." The same historian relates, that eleven camels laden with sugar were captured by the Christians. A similar adventure happened to Richard Cœur-de-Lion, in the second crusade. A third writer, in 1124, tells us, that " in Syria reeds grow that are full of honey ; by which is meant a sweet juice, which, by pressure of a screw engine, and concreted by fire, becomes sugar." These are the earliest notices of the method of making sugar ; and they refer to an apparatus and to processes used in the Saracen empire, and not known at that time, so far as European records show, to be used anywhere else. At the same time sugar was made at Tyre in Syria, then subject to the Saracens ; and, in 1169, that city is mentioned as " famous for excellent sugar."

The island of Sicily was the first spot upon which the sugar-cane is known to have been planted in Europe, though it is altogether likely, that it was planted by the Moors full as early, if not earlier, in Spain and Portugal. That island was conquered by the Saracens in the early part of the ninth century, and was retaken by the Normans at the close of the eleventh. Immediately after that event we find, that large quantities of sugar were made there. According to records still extant, William, the second king of Sicily, in 1166, made a donation to the convent of St. Benedict of " a sugar-mill, with all the workmen, privileges, and appurtenances thereto belonging."

If it was the crusaders who brought the sugar culture to Europe, how happened it, seeing that they were collected from all Europe, that no other part of that continent except Spain in the hands of the Arabs, and no other island of the Mediterranean except Crete, captured in the year 823, by an expedition from Spain, were favored with that invaluable

donation ? It was not until three hundred years later, that it found its way into Cyprus, Rhodes, and the Morea ; and this extension was not owing to rural tastes, or the spirit of improvement among the feudal barbarians, but to the commercial enterprise of the Venetians, who had for a long time carried on a lucrative trade in the article with India, Syria, Egypt, and Sicily, and were now, by conquest or purchase, the possessors of Crete, and the later seats of the sugar culture above mentioned.

It may be further remarked, that the most important and profitable of the manufacturing arts have never been propagated except by conquest or emigration. The woollen business was established in England by the weavers, fullers, and dyers, whom the frantic tyranny of the counts of Flanders and their French allies drove, and the wise policy of the Henrys and Edwards welcomed, to England. The cotton manufacture, derived to the Arabians from Hindostan, was by them diffused over Africa, and fixed in Europe ; and thence brought by an enterprising operative to the United States. It seems scarcely credible, that those half-naked, hard-riding demons, who are so often employed in stripping unfortunate Christians to the skin, are the identical people to whom Christendom is indebted for the comfort of a shirt. Such, however, is the fact. The Arabs conferred upon us that grateful, and now ornamental garment.

It was not until the time of Justinian, five hundred years after silk was known and purchased at enormous prices at Rome, that the silk culture was brought into the Eastern Empire by two Persian monks, who had pursued it in China. It was established in Italy by a colony of Greek captives, and carried from Milan to Lyons by a company of Italian workmen, engaged by Francis the First. Finally, the Huguenots fled from treachery and intolerance to impart their skill to Spitalfields. The silk manufacture is more simple and cheap than that of sugar has hitherto been, and yet it required twelve hundred years to travel from Constantinople to London ; and it has but just reached our shores after two hundred years more.

It may help us to form some adequate notion of the difficulty with which manufacturing arts are propagated, if we reflect how hard it was to naturalize the cotton and woollen manufactures in the United States, and how far they still are

from that fineness and finish, to which they attain in the workshops of Europe. Yet we speak a common language, are descended from common ancestors, and have always had close commercial and social relations with our teachers. How much greater must have been the difficulty and delay, if we had been strangers in origin and language, and enemies in religion.

The use of alkalies, in the clarification of the juice of the cane, was an invention of the Arabs. The original raw sugar of the East was debased by a mixture of mucilaginous matter, which opposed itself to the crystallization of the sugar, and determined it to a speedy decomposition after it was crystallized. To this day the Eastern sugar, except where the manufacture is directed by Europeans, or where the product has been converted by the Chinese into what we commonly call "rock candy," is much inferior to that of the West in purity, and in strength of grain. The only clarification, which the liquor appears to have undergone in the hands of the Eastern manipulators, was by skimming during the processes of evaporation and boiling. And, if we may judge from the imperfect and loose descriptions of modern travellers, this is the extent of their knowledge at the present day. They seem to know no other method of clarification in making sugar, and no art of refining except that of making candy.

How the Arabs came to adopt a different method, it is perhaps impossible at this day to determine. Discoveries of this nature do not readily obtain publicity in any country. They are usually involved in as much mystery, and kept under a monopoly as long, as possible. Another characteristic of the Arabian method was the use of earthen moulds, of a conical form, for crystallizing and curing the sugar. In the East, broad, earthen dishes were used for those purposes. These two characteristics of the Arabian method have come to us through the Spanish and Portuguese; and whence should they have derived them, except from the Arabs, Moors, or Saracens? — different names given to the same people from the relations to places and to people, which they successively sustained. *Arabs* (according to a probable etymology of the word) means *westerns*, because this people inhabited the *west* of Asia. When they had spread over the north of Africa, and occupied the remotest Hesperia of the ancient world, the body of their nation was,

in respect to the emigrants, *eastern*, and that is the signification of *Saracen*. *Moors* was a name given to them by the Spaniards and other Europeans, from the circumstance of their having conquered and converted the inhabitants of Mauritania or Morocco, incorporated them with their army, and issued immediately from their territory to take possession of Spain, Portugal, part of France and of Italy, Sicily, and the islands of the Ægæan Sea.

We have seen, that the Arabs had the art of cultivating the cane, and converting it into sugar. We know that sugar-canes, called "the chief ornament of Moorish husbandry," are still cultivated in Spain, and the manufacture of sugar carried on. It is likewise made in large quantities on the river Suz, in Morocco; and, at Teycut or Tattah, constitutes a leading article of traffic with caravans, which traverse the great desert, and vend it in Timbuctoo and other markets of Central Africa. Sugar is still a production of considerable importance in Egypt, particularly in the district of Fayoum, and, until lately, the Seraglio at Constantinople was furnished thence with the nicest refined sugar. In 1560, sugar was imported at Antwerp from Portugal and Barbary. At the same period it was an article of extensive manufacture and traffic at Thebes, Darotta, and Dongola in Nubia and Upper Egypt. All these are undoubtedly the remains of the Arabian plantations.

The Spanish and Portuguese word for sugar, is *azucar*, *açucar*, or *assucar*, and the Arabic *assokar* or *shuker*. This was derived from the Sanscrit, *sharkara* or *sarkara* meaning, in the primitives, *sweet salt*, and giving rise in antiquity to the terms *saccharon*, *sacchar*, *sacchari*, *saccharum*, and "India salt." The Arabic *shuker* is, with slight modifications, a universal term, except in China and the Malayan archipelago; proof enough that we received this commodity, and the art of preparing it, from neither of them, and that we and all the western nations are indebted for it to the Arabs, and through them to the Hindoos. The difference between the Spanish and Portuguese word, and other European names, is owing to the circumstance, that the two nations in close contact with the Arabs, incorporated the article *a* or *al* with the substantive, before which they heard it, as they did in a great many other instances, *algodon*, for example, which is properly *godon*, *goton*, or *koton*. The etymology of *mellasses* will further illustrate our position, that we derived the

art of sugar-making from the Spaniards and Portuguese, and through them from the Arabians. *Melasses*, more frequently, but incorrectly spelt, *molasses*, is an abbreviation of *mel de assucar*, signifying, in Spanish and Portuguese, *the honey of sugar*.

The Portuguese, under the auspices of Dom Henry, transplanted the sugar-cane from Sicily, as it is commonly supposed, though it might be from Portugal itself, to the islands of Madeira and St. Thomas. Herrera has raised great doubt of the historical correctness of the idea, that Sicily was resorted to at that time for sugar-canes. He declares positively, that they were carried to the Africo-Atlantic islands "from Granada, where they had been planted by the Moors."

It has been a subject of much dispute, whether the sugar-cane was introduced into America from Europe, Asia, or Africa, or whether it is indigenous here. The former is the opinion of all the historians of the old world, the latter of all the explorers of the new. Edwards reconciles them by supposing that both are true, which seems to be the most reasonable conclusion. It would be as absurd to suppose, that the early European settlers of America would fail to carry that plant, with whose great value and agreeable uses they had just become well acquainted, to their new abode, especially when they were growing and were worked up in great quantities in the Canaries, whence all the adventurers were accustomed to take their departure, as it would to question the authority of the writers, who positively affirm this fact. On the other hand, it would be an extravagant stretch of incredulity to doubt the clear testimony of the many eye-witnesses, who declare, that they found native sugar-canes in Guadaloupe, St. Vincent, Brazil, on the La Plata, and on the Mississippi; or the demonstration of Cook and Bourgainville, who brought a native and valuable variety from the Friendly Islands to the British and French West Indies.

It is asserted by some, that the plant was carried from Brazil to St. Domingo, having been previously brought to the former from the Portuguese kingdom of Angola, where it is still cultivated, or from the Portuguese possessions in Asia, where Vasco de Gama and his successors, the conquerors of a great part of India, found sugar in abundance. Whencesoever the sugar-cane came to St. Domingo, or

whether it came at all, it is certain, that a company of sugar-makers were carried from Palm Island, one of the Canaries, to establish the manufacture in that oldest, except Brazil, of the American settlements.

It is an interesting fact, that the art of sugar-making, propagated, we must conclude, both *east* and *west* from Asia, now completed, in opposite directions, the circumnavigation of the globe ; for, a few years after this establishment in St. Domingo, Cortez found, that both sirup and sugar were made from the stalks of maize, by the natives of Mexico, and sold in their markets. The aborigines of Virginia, and probably of all North America, had the knowledge of making sugar from the juice of the maple. From them the Anglo-American settlers undoubtedly derived it.

In 1643, the English began the sugar-business in Barbadoes, and, in 1648, the French, in Guadaloupe. The Dutch, expelled from Brazil, where they manufactured sugar in the sixteenth century, took refuge in Curaçoa, St. Eustatia, and other islands, and finally, upon the exchange of New Amsterdam for English Guiana, in Surinam. To all these they transferred a branch of industry, which they had learned to practise, and knew how to appreciate.

It is not known at what time the use of sugar began in England. It was probably as late as the fourteenth century. At that time it begins to take, in trope and verse, the place which honey had occupied, without a rival, since Moses and Homer. Chaucer uses the epithet “ sugreed over.” The chamberlain of Scotland, in 1329, speaks of loaves of sugar sold in that country at one ounce of silver, equal to four dollars of our money, per pound. In 1333, white sugar appears among the household expenses of Humbert, a nobleman of Vienne, and it is mentioned by Eustace Deschamps as among the heaviest expenses of housekeeping. George Peale tells us, that sugar with wine was a common drink in the sixteenth century. It did not become an article of ordinary consumption until the beginning of the seventeenth century. At that period, the Venetians imported it from Sicily and Egypt, and probably produced it in Cyprus, Crete, and the Morea. One of their countrymen, about two centuries before, had invented the art of refining, for which he received the sum of one hundred thousand ducats, equal to three or four hundred thousand dollars at the present time. Previously to this they

had pursued the Chinese method, and made candy only. This inventor adopted the cones from the Arabians, and probably obtained from their manner of clarification the idea, upon which he so far improved as to effect at last the complete purification of his product. It was from the Venetian refineries, that France and England procured their small and high-priced supplies in the fourteenth and fifteenth centuries.

By the creation of sugar plantations in the Portuguese and Spanish islands of Madeira, St. Thomas, and the Canaries, the stock was considerably increased. We begin then, for the first time, to have accounts of the number of sugar-mills, and the quantities manufactured. Thus we are told, that in the island of St. Thomas there were, in 1524, seventy mills, making on an average 66,428 lbs. each, and upwards of two thousand tons in all. It was from those islands, that Europe was for half a century mainly supplied. But the rapid exhaustion of the soil seems inseparable from the cultivation of the cane with the labor of slaves and serfs. It is reasonable to suppose, that this was the great cause of the successive migrations of this business westward, and its early decline in Sicily, Spain, and the Africo-Atlantic islands.

In St. Domingo there were, in 1518, twenty-eight sugar presses. In about half a century, this island succeeded to the inheritance of the markets of Europe, which it monopolized and enlarged during a century and a half, exporting sixty-five thousand tons in one year, being about 100,000,000 lbs. surplus, after supplying the demand of the mother country. In any possible situation of that island, it could not have maintained until this time that monopoly, and that rate of production. At the beginning of the present century, the entire exportation from the West Indies and American settlements of every description, was 440,800,000 lbs. ; now it is 400,000,000 lbs. from the British West Indies alone, and 700,000,000 lbs. more from Brazil and the Spanish, French, Dutch, and Danish colonies. In 1750, only 80,000,000 lbs. were exported from the British West Indies, one fifth of the present export.

Of course the consumption of sugar has greatly increased during the last half century ; and it seems destined to an indefinite extension. It is so nutritive, wholesome, and agreeable, that there can never be a limit to its use except in a

prohibition or an inability to buy it. Men and nations differ widely in their tastes and habits in respect to most kinds of food, sauce, and drinks. Neither wheat, rice, flesh, nor potatoes can command unanimous favor. No article of house-keeping, save sugar, can be named, which is universally acceptable, to the infant and the aged, the civilized and the savage.

The population of the British West Indies is equal to that of Cuba ; but their consumption of sugar was, in 1827, only 13,000,000 lbs., eighteen pounds to an inhabitant, while that of Cuba was, in the same year, 44,000,000 lbs., or sixty-three lbs. to an inhabitant. This difference is presumed to be owing to the predominance of the free over the slave population, in the latter island. The ratio of the free population of Cuba to the slave, is three to one ; but in the British West Indies, one to three. This proportion would give the difference of the quantities of sugar consumed, with almost entire accuracy.

The population of all the sugar-growing countries in the world is about 468,000,000. It is not to be presumed, that each individual of this number consumes as much as the luxurious West Indian ; but it will not be extravagant to suppose, that they all consume as largely as the Mexicans. Mexico, by the lowness of wages, and the ignorance and poverty of the mass, may be considered as a fair representative of the nations, inhabiting that belt of the earth, which produces sugar-canes. She consumes, according to M. Humboldt, ten pounds to an inhabitant, all of domestic production. We thus determine proximately, that the consumption of the other Hispano-American nations, and of the swarms which people the East, is 5,000,000,000 lbs. per annum, nearly four times as much as is used in Europe and the United States. Great Britain consumes 400,000,000 lbs., about twenty-four pounds to each inhabitant ; the United States 200,000,000 lbs., sixteen pounds to an inhabitant ; our domestic production being estimated at 50,000 hhds., or 50,000,000 lbs. In Ireland, the consumption is 40,000,000 lbs., five pounds to an individual. In Russia, it is much less, being but a little more than one pound to a person, and 60,000,000 in the whole, unless the article be introduced inland from China, by way of Kiachta, as to some extent it probably is. Of the quantity

consumed in Russia, we suppose 8,000,000 lbs. to be beet sugar. Belgium consumes 30,000,000 lbs., seven pounds to an inhabitant, of which 5,000,000 lbs. are beet ; and Prussia, Austria, and the rest of Germany, 200,000,000 lbs., of which 20,000,000 lbs. may be beet. This is four pounds and a half to an inhabitant. Holland consumes 50,000,000 lbs., sixteen pounds to an inhabitant ; Spain, the same, which is but four pounds to an inhabitant ; France, 230,304,549 lbs., seven pounds to each inhabitant. Of this, 107,905,785 lbs. were, in 1836, made from beet-roots. With the exception of a few manufactories in Italy, the above figures show the extent of the beet-sugar culture. Thus we have, for the total consumption of sugar in Europe, 1,267,000,000 lbs., of which 140,000,000, or 62,500 tons, are beet sugar ; and, for the total consumption throughout the world, 6,267,000,000 lbs., worth, at six cents a pound, \$376,020,000.

The cost of the production of cane sugar varies. It depends mainly on the price of labor. In the East, where labor is from 6 to 10 cents a day, sugar costs to the manufacturer from 1 to 2 cents a pound. In the Americas, where, with the exception of the Hispano-American republics, no wages until very recently have been paid to the laborer, the cost is 3 cents a pound. The price for exportation will average $3\frac{1}{2}$ cents in the East Indies, and $4\frac{3}{4}$ in the West Indies and other sugar-growing portions of America. These prices include the profits of the native or resident merchant. The average cost to the importer, exclusive of duty, is from 5 to $5\frac{1}{2}$ cents for muscovado and brown sugar, and 7 to 8 cents for white. These prices include freight, insurance, and commissions. Add thereto the respective custom-house duties, and we shall have the wholesale prices of every country. Thus the duty in the United States is $2\frac{1}{2}$ cents on brown sugar ; add this to 5 and $5\frac{1}{2}$, and we have $7\frac{1}{2}$ and 8, the average wholesale prices of New York, Boston, and Philadelphia. The duty on clayed sugar is $3\frac{1}{2}$ cents ; add this to the above price, and we have 10 to 12 cents, the ordinary price of white clayed sugars. In France, the duty on brown sugar is $4\frac{1}{4}$ cents ; in England, it is $4\frac{3}{4}$; consequently, in the markets of those countries, they cannot be at less than from 9 to 10, and 10 to 11 cents respectively. The grocers put on 2 cents more, so that the article costs to the consumer,

In the United States . . .	from 9 to 10 cents.
France	11 to 12 “
England	12 to 13 “
Hamburg (<i>a free port</i>)	7 to 8 “

Thus, sugar costs the consumer, in the United States, double the price of importation ; and, in France and England, two and a half times that price. In Prussia, the duty is the same as in Great Britain ; but in Russia, according to the price the article bears there, it cannot be less than $7\frac{1}{2}$ cents per pound.

The consumption of molasses is trifling, except in the United States and Great Britain. There is some vent for it on the continent, to be used in curing tobacco ; and in England it is used for making a bastard sugar, and for cheap preserves. In the United States alone is it used for the table. The quantity of refined sugar consumed in the United States is small compared with the brown. It probably does not exceed one tenth ; while, on the contrary, in France it constitutes four fifths of the entire consumption. The proportion is less than this in Great Britain ; but it is much greater there, and in Europe generally, than in the United States. Brown sugar contains, on an average, three to five per cent. of dirt ; of course, molasses cannot be *more* pure. The consumption of this last in the United States, is about 150,000,000 lbs. annually ; but probably more than half of it has heretofore been distilled into rum, producing more than 10,000,000 gallons per annum.

The sugar-cane appears to have been, in all ages, a source of beverage in some form. Lucan describes the Eastern recruits of Pompey's army thus,

— “ *quique bibunt tenerà ab arundine succos.* ”

The Jews had an inebriating liquor which they called *sacar*, from which some etymologists in fact derive *saccharum*, but we think erroneously ; because it is certain, that the ancient sugar, with its name *saccharon*, came from India, and equally certain, that the Jews knew not sugar. It is not improbable, however, that some relationship exists between the Hebrew *sacar*, and the Hindoo *sharkara*, or *sarkara*, inasmuch as the drink, expressed by the former, was the juice of a reed, and, before fermentation, sweet. Bruce found the cane used in Egypt and Nubia for making a drink, by concocting it in water. The inhabitants of Angola have made a similar use

of it from time immemorial ; so too did the ancient Ethiopians. The people of all countries are fond of chewing and sucking sugar-canes. The laborers everywhere grow fat towards the maturity, and during the cropping, of the canes. The Arabian horses were observed to grow fat in Spain by feeding on the pulp, after the juice was expressed. Sugar, eaten in considerable quantities, has the same effect. The king of Cochin-China causes his body-guard, consisting of a hundred men, to feed mostly on sugar and sugar-canes, in order that they may appear more stout and handsome than other troops. Many aged persons have found great benefit from the free use of sugar. It tends to render the skin and cartilages soft and supple. It might be excellent nourishment for patients submitting to experiments upon distorted limbs or spine. It is slightly laxative, and was valued on that account by the ancient practitioners. Dissolved in water, it is an antidote against arsenic, corrosive sublimate, verdigris, blue vitriol, and other mineral poisons, and also those of fish, as lobster, dolphin, conger-eel, &c. "Sugar," says the author of "Diet and Digestion," "seems to be the first support of vegetable life, and it is well known to be the principal food of young animals. It perhaps yields more chyle than any other constituent of plants." Sugar, like common salt, is useful after excess in eating. It precipitates digestion, particularly with or after fruits ; it excites the secretions of the digestive organs, and is good for old and inactive stomachs. There are many successful examples of aged persons taking it as their principal food during many years. Dr. Rush entertained a high opinion of its dietetical qualities.

But, in proportion as sugar is wholesome, alcohol, which is made from the same principle in plants, is deleterious. The solid and nutritious part of milk is sugar ; but, when fermented and distilled, it becomes one of the most inflaming of ardent spirits, i. e. *burning* spirits.

The origin of the excessive importation of molasses into this country, and of the excessive use of distilled spirits, resulting from that importation, are among the most instructive matters in our history.

It is but little more than a century since that importation began. In the French West Indies the sugar manufacturers used to throw away their molasses, as indeed they did at first in Jamaica, and as they do to this day in the islands of Bour-

bon and Java. The New-Englanders, particularly in and about Boston, taking note of this circumstance, induced the French, for a trifling consideration, to preserve this residuum, and deliver it on board the colonial traders. Arrived at Boston and other ports, the adventurers entered the article free of duty, and it was then converted into New England rum. In a few years, the business so enlarged itself, that the trade was extended to the Dutch and Danish colonies. In exchange, our people gave to the Frenchmen and others, horses and mules for their sugar-mills, lumber for their houses, and fish and other provisions for their plantations. In 1715, a few years after the commencement of this traffic, the British island colonies complained of it to the government, as diminishing the demand for their products, and disappointing them of their wonted supplies. Hereupon a fierce and protracted contest arose betwixt the island and continental colonies, which was not terminated until 1733, when the islands prevailed, and a duty of 6*d.* a gallon was laid on molasses, and 5*s.* per cwt. on sugars, imported into the continental colonies from any foreign port or place. The penalty for violating the act was to be the forfeiture of vessel and cargo. But the New-Englanders, who had disputed every inch of the passage of the act, seem never to have thought of submitting to it after it was passed; and they continued the old traffic, eluding the duties and defying the law. A British fleet was sent to enforce it, and a state of irritation arose, in which the parties all but came to blows. In fact, this did never cease, from that time down to the Revolution; and the famous act for raising a revenue in America was called, in the language of the day, "the sugar and molasses act."

The principal reasons alleged for the trade were, that a large supply of rum was indispensable to the continental colonists for carrying on the Indian trade and the fisheries. These reasons have ceased. Rum has nearly finished its mission to the poor Indians; and the fishermen, we believe, generally go upon the temperance plan. The real root of the matter was, and is, that no other people, since the world began, were ever furnished with so great a quantity of exciting liquor for so small a price. The custom-house duties, in other countries, either kept out molasses and rum, or admitted them with so heavy conditions, that they could not

be afforded in such abundance as they have been here. Ardent spirits were unknown, except as a medicine in the druggist's shop, until the cane sugar and molasses makers of the West Indies brought rum into the world. The taste once formed, demand arose for brandy, perry, gin, and whiskey. Anderson, in his "Origin of Commerce," remarks ; " The consumption of rum in New England is so great, that an author on this subject asserts, that there has been 20,000 hhds. of French *molossus* manufactured into rum at Boston in one year, so vast is the demand for that liquor." Sir William Douglass, in a work printed at Boston, in 1755, tells us, that " spirits, (*spiritus ardent*es,) not above a century ago, were used only as officinal cordials, but now are become an endemical plague, being a pernicious ingredient in most of our beverages."

The duty of 2 cents on brown sugar, in the United States, was originally laid for revenue, though it must be considered high for that purpose ; being nearly fifty per cent. on the cost. At the time of the purchase of Louisiana, it was advanced to $2\frac{1}{2}$ cents, probably for protection. During the last war with Great Britain, it was doubled, being then 5 cents. At the peace it was fixed at 3 cents, avowedly for protection. In 1832, it was brought back to the rate of $2\frac{1}{2}$ cents ; and this is maintained for the encouragement of the sugar-planters of Louisiana, Florida, Arkansas, Mississippi, Alabama, and Georgia. The article is afforded in the New Orleans market, and on the Louisiana plantations, at 5 to 6 cents a pound. The planters have repeatedly declared, that, at less prices, the business cannot be sustained. The cost of production, when this industry was most flourishing, was $2\frac{1}{2}$ to $3\frac{1}{2}$ cents, exclusive of the interest on the investment.

We have now surveyed the field of competition in which the beet-sugar business must take root, if that be its destiny in this country. It is certain, that the high hopes conceived of it have suffered considerable abatement from experiments made, and views put forth, in Great Britain. These it is our duty to weigh, and to determine how far they ought to influence the resolutions of North American cultivators and capitalists. But it is necessary that we should first examine, with some minuteness, the history and present condition of beet-sugar industry.

It is now nearly a hundred years since Margraff, a Prussian chemist, residing at Berlin, made the discovery, that the beet contained a good crystallizable sugar. His attention was first drawn to this subject by the saccharine taste of the beet, and the crystalline appearance of its flesh, when examined with a microscope. Having cut the beet into thin slices, he dried perfectly, and then pulverized them. To eight ounces of the powder he added twelve of highly rectified spirits of wine, and exposed the mixture to a gentle heat in a sand-bath. As soon as the liquid reached the boiling point, he removed it from the fire, and filtered it into a flask, which he corked up, and left to itself. In a few weeks, he perceived that crystals were formed, which exhibited all the physical and chemical properties of the sugar-cane's. The alcohol still contained sugar in solution, and a resinous matter, which he disengaged by evaporation. Having submitted several other vegetable substances (as parsnips, skerret, and dried grapes) to the same treatment, he obtained sugar from each. In 1747, he addressed to the Academy of Berlin a memoir, entitled, "Chemical Experiments, made with a view to extract genuine Sugar from several Plants which grow in these Countries."

Margraff solved the important problem, that genuine sugar was not confined to the cane. After this, he enlarged and varied his experiments, but did not invent means of making sugar from the new material on a scale sufficiently large to render it an object of interest to capitalists. Yet he seems to have had a prescience, that his discovery would one day assume importance. He commended it to the attention of the Prussian cultivators, and particularly the small farmers, as offering a new and beneficial branch of agriculture.

Margraff died in 1782. He was a member of the Academy of Berlin, Director of the Class of Natural Philosophy, and Fellow of the Academy of Sciences at Paris. His works were collected and published in two volumes, octavo, in French, 1767. A German translation was published at Leipsic, the following year.

It was Achard, also a chemist of Berlin, who discovered the method of extracting the sugar from the beet on a large scale, and at a moderate expense. He first announced this result in 1797. In 1799, a letter from him was inserted in the *Annales de Chimie*, in which he detailed his

method. He there states the cost at $4\frac{3}{4}$ cents, the pound of Silesia, — or about 6 cents the pound avoirdupois, — without counting the benefit to be derived from the residuums. He also expressed the opinion, that, with these included, and with some improvements in the processes, this sugar might be produced at half that price. This announcement caused a great sensation in France. It engrossed the attention of the Parisian world ; eliciting, alternately, ridicule and admiration. The high price to which sugar had risen in France, in consequence of the capture of nearly all her colonial possessions, gave something more than a speculative and passing interest to the ideas of Achard. The National Institute appointed a commission to examine the subject. The result of their investigation was, that the cost of raw sugar of the beet would be 16 cents a pound. The price of sugar was such, that even at that rate a very large profit might have been cleared ; but this consideration was not sufficient to induce many persons to take the risk of a peace with England, supposed at that time to be approaching. Only two establishments were formed ; one at St. Ouen, and the other at Chelles, in the environs of Paris. Both of them were failures ; partly from the bad quality of their beets, and partly from the ignorance and inexperience of the conductors and workmen. With them went down the high hopes, which had arisen, of this new branch of industry in France.

It is difficult to say, whether these hopes would ever have been resuscitated, if political events of an overruling nature had not supervened. By the Berlin and Milan decrees, all colonial articles were prohibited, and that famous “continental system,” so wide and wild in its design, but so important and permanent in its effects, was established. From that time, 1806, chemists and economists applied themselves with renewed zeal to the search after an indigenous source for the supply of sugar. It was thought, at one time, that the desideratum had been attained in the production of grape sugar, or sirup ; of which, in the course of two years, many million pounds were made. This sugar, although very abundant in some varieties of the grape, raised in a southern latitude, possesses only two fifths of the sweetening power of the cane and beet sugar. Nevertheless, sugar being at about one dollar a pound, a great number of manufactories were erected,

and science and industry were tasked to the utmost, to improve the processes, and to bring it to perfect sugar.

In this state of things, it was announced, that beet-sugar manufactories had been all along carried on successfully in Prussia. It was declared, that from 4 to 6 per cent. of sugar was obtained from the beet, besides several other valuable matters. Other German chemists had instituted experiments, and published results substantially the same as Achard's. At length, in 1809–10, experiments were recommenced in France, particularly by M. Deyeux of the Institute, who had reported upon the subject in 1800. The experiments resulted in the production of a considerable quantity of sugar, both clayed and refined, which, as specimens, served to revive and increase the confidence of France in this source of supply. No more than 1 to 2 per cent. was obtained; the beets being of a bad sort, and raised in the neighbourhood of Paris, where a vast deal of ammoniacal manure, hostile to the production of saccharine, is used.

In 1811, M. Drappier, of Lille, worked about fifteen tons of beets, from which he obtained $2\frac{1}{2}$ per cent. of sugar. In the winter of the same year, an experimenter at Paris succeeded in obtaining $4\frac{1}{2}$ per cent. from white beets, raised at a considerable distance from Paris, and without any manure. This was the first essay in France, which approximated to the results of Achard. It was made by M. Charles Durosne, and was detailed in the *Moniteur*. It demonstrated how faulty had been their selection of sorts, and the mode of culture. At this time, Achard had published in German an extensive work, in which he had treated with minuteness every department of the business, from the raising of the seed to the refining of the sugar. This treatise contained not only Achard's experience of thirteen years, but also accounts of the manufacture of beet sugar, on a grand scale, by other persons in Prussia. The result of these enterprises, as reported by a commission appointed by the Prussian government to investigate the subject, was, that in the case presented to their consideration, 60,800 lbs. of sugar were manufactured from 1,000,000 lbs. of beets, which is 6 pounds $1\frac{1}{4}$ oz. per cent., costing for cultivation and manufacture, 6,6 cents a pound, and selling at 16,17 cents. The profit was stated at 136 per cent., without reckoning

27,883 gallons of vinegar, worth \$1,987.25 ; 155,400 lbs. of feed for beasts, worth \$97.16 ; and after deducting \$1,382.25, for the greater supposed expense of refining beet sugar. This, however, has since been recognised as an error ; beet sugar being in fact the most profitable to the refiner, by reason of the superior strength of the grain, and of the deterioration which the cane sugar undergoes by fermentation and decomposition during long voyages and storages, before it reaches the pans of the refiners. This loss is estimated, in France, at 14 per cent. on East India sugar, and at 7 on West India. The British custom-house allows 1 per cent. a month for the waste on bonded sugar.

Such was the result of the operations in the manufactory of the Baron de Koppy at Krayn, near Strehlen in Silesia.

Another course of experiments was instituted by Dr. Neubeck, the royal commissioner, who obtained the following results, working upon a material of one million of kilogrammes.

	\$.	c.
Sugar, 101,472 kilg.'s at 16.72 cents a pound,	16,985	05
Spirits of Wine and Vinegar, made from the	8,083	38
molasses and pulp,		
Mash used for feeding and fattening animals,	189	53
Total,	25,257	96
Expense,	7,892	28
Net profit, ^	17,365	68

Mr. Achard's sugar, according to the report of Dr. Neubeck, cost 7.7 cents a pound, and yielded at 16.72 cents, the price of sale, a profit of 8.92 cents a pound. Their beets yielded 4.6 per cent. of sugar.

The experiment at Lille (M. Drappier's) was less successful. He obtained only 1.3 per cent. of refined sugar ; and, although this merchandise was then at 35 cents a pound, this price hardly covered the expenses of production, without, however, counting the residuums.

In January, 1812, Napoleon issued a decree establishing five chemical schools for teaching the processes of beet sugar making, detailing one hundred students from the schools of medicine, pharmacy, and chemistry, to be instructed in those

establishments, and creating four imperial manufactories, capable of making 4,408,000 lbs. of raw sugar annually. Munificent premiums were also decreed to several individuals, who had already distinguished themselves by a successful application to this new branch of industry. A considerable number of manufactories were immediately added to those already existing in France; and, in the season of 1813, a large quantity of sugar, both raw and refined, was produced. A notable improvement was introduced by M. Mathieu de Dombasle, a learned and experienced cultivator and chemist. It consisted in applying to the beet juice the colonial process of depuration, appropriately called in France *défécation*. This was in fact very analogous to the improvement, which the Arabs effected in the Oriental method. Achard used sulphuric acid in this operation, and for the crystallization broad dishes, not unlike those said to be used in China at this day. The colonial process of *défécation* by lime is now nearly universal in France, as is likewise the substitution of the mould, or conical pot, for the crystallizers of Achard.

Such was the prosperous condition of this manufacture, when the disasters of Moscow brought upon it an uncertain political future, that bane of all great industrial enterprises. Confidence and energy gradually yielded to fear and discouragement. A faint and fitful struggle was maintained during another year, until the Cossacks, quartered in the sugar-mills, and the allied artillery, seizing upon the beasts that moved them, gave the manufacturers the *coup de grace*. The officers billeted at their houses became from curiosity their principal customers, being struck with the brilliancy and purity of this unexpected product. After the final overthrow of Napoleon at Waterloo, the price of refined sugar settled down at 12 cents a pound, and raw at 7. Still, to the surprise of all, two beet-sugar manufactories did survive the shock of this tremendous reverse, more useful to this industry, and to mankind, than all its preceding prosperity; because it demonstrated, what never could have been done under the unnatural stimulus of the "continental system," that there was an intrinsic value in the new industry, rendering it capable of independent existence, and raising it out of the reach of accident, political enmity, or caprice. The establishments which survived were at Arras, in the De-

partment of the Pas de Calais, and at Pont à Mousson, near Nancy, in the Department of the Meurthe.

After the retirement of the allied troops, in 1818, the government began to turn its attention to the encouragement of an industry, which had struggled meritoriously and successfully to preserve a boon to the French nation. Many eminent and public-spirited citizens raised up establishments, more perhaps to give the benefit of experiments to their countrymen, than with a view to profitable investment. Men of genius and profound research occupied themselves with elaborate experiments, and published their results. Among the most important were the Count Chaptal, who detailed, in *Memoirs* on the subject, and in his “*Agricultural Chemistry*,” the experience of many years as a cultivator of beets and manufacturer of sugar ; and M. Dombasle, who did the same, with admirable clearness and precision, in his work entitled “*Facts and Observations relating to the Manufacture of Beet Sugar*.” The latter, with a prospect of many more years of usefulness, is still at the farm-school at Roville, near Lunéville, in Lorraine, devoted to agricultural and chemical studies, and imparting the results of his long experience, fertile genius, and assiduous application, through his publications which go to all parts of the world, and to pupils who come from every nation. As an intelligent and industrious operative, M. Crespel Delisse, of Arras, is worthy of honorable mention. This gentleman was originally a laborer. He became the foreman of the first beet-sugar manufactory at Arras. The proprietor, who had invested an immense capital, sank in the general wreck of 1814 – 15. M. Crespel succeeded him, with the great advantage of having his fixtures at about one fourth of their real value. This was one of the two establishments which survived, and it continues to this day to be one of the most extensive and successful in France. M. Crespel is interested as part or sole proprietor in seven or eight other farms and factories. He has received the gold medal of the Society for the Encouragement of Agriculture, at Paris, and the honors of knighthood from the French and other European sovereigns.

The method in general use in France is to crush, or grind, the beet with an instrument called a *rasp*, though its functions would be better described by the word *grater*. It is cylindrical, and revolves four hundred or more times in a

minute. This reduces the beets to a very fine pulp. They are then pressed in hydraulic presses of great power, and the juice defecated, evaporated, boiled, and filtered, in very much the same manner as the cane-juice in the colonies. The great difference is, that the beet-sugar machinery has been rapidly improved, and the cane-planters have begun to avail themselves of the improvements. There is, however, another method of extracting the saccharine, which dispenses altogether with grating and pressing. This is called *maceration*. It was first proposed by Dombasle, and has been tried in various forms, with more or less success. M. Martin de Roclincourt, originally a captain of engineers, is the inventor of an ingenious and valuable machine for performing this operation. The beet is first cut into ribands, about one line in thickness. They are then plunged into boiling water, which is admitted into the machine at regular intervals, in regular doses. The ribands remain passing through the circuit of the machine during one hour, and steam is occasionally admitted to keep up the heat. In this time, the sugar contained in the ribands is dissolved, and remains in solution in the water, while the ribands, now called pulp, are discharged on the side of the machine opposite to that where they entered it; the liquor containing the saccharine, flows off in another direction to the defecating pans.

This method is employed to a considerable extent in France, but by no means so generally as the rasp and press. Its advantages are, that it gives rather more and a rather better product, and requires a great deal less labor. Its disadvantages are, that it takes a great deal more fuel, and does not leave the pulp in so good a state for feeding; there being too much water in it, and less saccharine, than in that which comes from the press. It might be subjected to pressure, by which a little additional liquor would be obtained for the pans, and the pulp made vastly better for feeding. This, however, would require so much power of the press, and so much pains, that the French generally feed with the pulp just as it falls from the machine. We have little hesitation in giving the preference to this method in a country where fuel is cheap and labor dear. The immense establishment commenced in London two years ago, but abandoned in consequence of the excise of $4\frac{3}{4}$ cents a pound, which the government hastened to impose in order to guard the West India in-

terest, was upon this system. On the other hand, the only other beet-sugar manufactory, upon a scale of any importance, in Great Britain and Ireland, which is situated near Dublin, has adopted the rasp and press. The former establishment delivered for consumption a considerable quantity of beautiful refined sugar, which was so completely undistinguishable from refined cane sugar, that the government issued an extraordinary notice, that any fraud in the exportation of it with the benefit of drawback would, if detected, be punished with the utmost severity. Whether the establishment in Ireland still exists, we are not informed. It is, however, the opinion of persons skilled in the manufacture and refining of sugar, and who have had small experimental beet-sugar factories near London, that the business cannot be sustained under a duty of $4\frac{1}{2}$ cents. Others are confident, that, in consequence of the application of the fibre to paper-making, by which the value of the pulp is enhanced fourfold, the business will yet get a permanent footing in Great Britain. We do not think a fair experiment has yet been made in that country. The original prejudice against the pretensions of the new manufacture, forced forward by the odious machinery of the "continental system" and the power of the empire, to become a rival of their colonial industry, was of course virulent and obstinate. That it still abides in the mass of the British nation, and in minds which ought to be above it, is apparent from some limited and rather dogmatical views contained in No. CXXXI. of the "Edinburgh Review."

The protection of the beet-sugar culture in France, and in other nations on the continent, is very high, as we have seen; much higher than protection of any article of general and necessary use ought ever to be. It is at least a hundred per cent. on the cost. But we have also seen, that this business did not succumb to the shock and disappointment occasioned by the fall from a protection of three hundred per cent. to no protection at all. After the general peace, sugar fell as low in France as it is in the free ports of Europe at this time. An immense stock had accumulated in the sugar colonies, which had been successively captured, and were in the hands of the British, insomuch that they actually fed horses and other animals upon sugar. Yet, at that very moment, the working classes of Great Britain, under the onerous duty of

6 cents a pound, were drinking their coffee without sugar, as indeed they continue to do, to a great extent, to this day. This is to give a monopoly of the market to the West India planters. Here is folly and extravagance of taxation and protection, which quite eclipse the French beet-sugar policy. The Edinburgh reviewer states, that "the great *impetus* given to it was in 1806." Now, in truth, the beet-sugar manufacture *did not exist in France* at that time, nor until four years after, and not then to an extent worth naming. No "impetus" was given to it until the experiments of 1811, and the decrees of the Emperor, awarding premiums, and establishing schools and model factories, in 1812. Again he asserts, that "in two or three years more, France will be fleeced of £2,600,000 per annum for the benefit of the landowners of *Alsace*." Such allusions, however slight in themselves, tend to gain the confidence of the reader in the minuteness and accuracy of a writer's knowledge. But Alsace is not a seat of this manufacture; comprising two departments, the Upper and Lower Rhine, it has but five sugar manufactories, while the Département du Nord has two hundred and twenty-six, and the Pas-de-Calais, one hundred and thirty-eight. These errors show, that the writer had not examined the history and present state of the beet-sugar business in France, and was not therefore fully competent to pronounce an opinion upon it. His essential error lies in not taking into view the fact, with which he was probably unacquainted, that it has already encountered and survived that test of its utility, which he himself proposes, and before which he says it "would quickly disappear," viz. a free competition with colonial and foreign sugar, and an extreme depression of price.

The condemnation of beet-sugar, in the eye of the Scottish economist, is, that it has received protection. Tried by the same rule, what must be the fate of West India sugar, or of any great branch of British industry? Or of the Louisiana cane-planters, or of the American cotton and woollen manufacturers, coal-miners, salt-makers, hat-makers, tailors, and shoemakers? The article is, in fact, a dash at *tariffs*. That battle we at present decline, referring the assailant to an abler antagonist in the same journal, about eight years back.

It does not appear, that our contemporary had examined any of the French works upon his subject, except a couple of

pamphlets by a merchant of Havre, who was probably interested in the colonial sugar trade, which, when beet sugar arose, was enjoying an absolute monopoly of the kingdom. The beet sugar has reduced the price of sugar in France 25 per cent., and has of course much increased the consumption of the article. The first of these facts is not noticed, and the second is denied. We have often heard the French manufacturers regret, that competition has reduced the price of sugar, since their establishments commenced, from 15 to 10 *sous* the pound; and it appears by the Report in the Chamber of Deputies, prefixed to this article, that the sales at Paris alone, from October 1st, 1835, to September 30th, 1836, increased 17,000,000 lbs. But the French Chambers, in 1837, laid a duty on indigenous sugar, which will amount, expenses of collection included, to 1.7 cents a pound. Of course, this leaves the protection in France at 2.55 cents; no more than that which the cane-sugar planters of the United States enjoy, and not so much by 6 cents a pound as the British discriminating duty in favor of her sugar colonies!

Will the beet-sugar manufacturers of France be able to sustain themselves under this change of policy? This is a question which experience must decide. Undoubtedly, the legislature firmly believed that they would, or they would not have imposed the duty; for the French no more think of sacrificing this interest at home to the colonies, or to any other object, than they think of removing Paris to the island of Martinique. Many of the manufacturers will succumb, because it is a law of political economy, that if a business is better than ordinary, it will cause a proportional rush of competitors to it, a part of whom will adventure without adequate skill and capital, trusting to the goodness of the business to make up for these deficiencies.

The culture and manufacture of beet sugar in France, according to the result of ten cases, which we have examined, has yielded of late years an average profit of $49\frac{1}{2}$ per cent. on capital. In some of these cases, the profit was as low as 9, and in others as high as 90, per cent. Now, as the duty of 1.7 cents amounts to a reduction of 22 per cent. on the former rate of profit, it follows, of course, that all those establishments, which, on the scale of profit are below 22 per cent., must go down, unless sustained at an annual loss. Even many

of those which would range on that scale above 20 per cent., but which have proceeded principally or wholly (which is not often the case in France) on borrowed capital, trusting to larger profits for the means of extinguishing the original debt, will doubtless fail. The probable number of failures in consequence of the law, was estimated at two hundred, out of a total of five hundred and fifty establishments. Others will probably remove from France, and set up in Belgium, Germany, Russia, or Austria, where protection is greater, and, what is more material, stabler ; for those countries have no colonial interest to consult. Our opinion is, however, that the law will undergo some modification before it shall have produced this last consequence. These failures or removals, if they shall take place, will not show what protection, or whether any protection, is really needed. They will be the natural result of subtracting from a business a protection, which it had been accustomed to have, and on which it relied.

But let us consider for a moment what are the conditions, under which a manufactory is to go on in France, if the tax shall stand. According to the results of the working of twenty-nine French factories, situated in every variety of locality, the average cost of the production of beet-sugar in France is 6.6 cents per pound. The lowest rate, which we find, is 4.9 cents ; the highest 8.6 cents per pound. But, in these results, the pulp and molasses are the only accessory products taken into the account ; and these, only at low venal values, which are not more than from one third to one half of what they are really worth, when used with judgment and economy on the spot, without the cost and uncertainty of procuring them from a distance. But there are other accessory benefits, very important in rural economy, which are left out of sight in these accounts. These accessory benefits are ;

1. The leaves, which constitute an excellent green feed, which may be used as such from August to November, two or three months ; or they may be dried and laid in for winter. They are worth five dollars an acre.

2. The manure, which is found to be increased from *three* to *four* fold on farms where sugar is manufactured. This manure, coming from the stables, or from the scums and deposites of the defecating pans, or from the bone-black, which is much used, is of the very best quality, and a portion

of it acts upon vegetation with a promptness and energy truly extraordinary.

3. The trimmings of the beets, preparatory to their being submitted to the washing-machine. These consist of the decayed parts of the beets, and the forked and fibrous roots, which are cut from them in the process of relieving them from adhesive earths, with which, in most kinds of soil, they will be more or less loaded. Chaptal considers the daily trimmings of 12,000 lbs. of beets sufficient to feed from twenty-five to thirty swine, during the manufacturing season. The quantity of beets worked up in the French factories, is rarely less than 20,000 lbs. per day ; it is in some more than 100,000 lbs. Many manufacturers merely transport the trimmings to the fields, there to decay, and serve, to some extent, as manure.

4. The ashes coming from the furnaces. These are valuable, whether sold to the soap-boiler, scattered upon the fields, or cast into the farm-yard.

It will be readily perceived, that these items are important, and some of them all-important, to farmers.

M. Dombasle estimates the molasses and pulp, if the first be used by the proprietor, for feeding and fattening cattle, and the second for distillation, as worth 35 per cent. of the whole expenses of a sugar establishment ; but he leaves out the four items which we have enumerated above. We doubt not that those are worth to the *cultivator* as much more ; making 70 per cent. of the costs of producing the sugar defrayed by the accessory and agricultural benefits. Let us listen for a moment to M. Crespel Delisse, who thus testifies, February, 1827, before a Committee of the Chamber of Deputies ;

“The culture of the beet has increased remarkably the value of real estate. He lately purchased, at the rate of \$ 152 an acre, some lands which were let at \$ 3·80 an acre. Since they have been cultivated with the beet in the rotation of crops, the number of sheep thereon has been doubled, and the horned cattle trebled. In a few years the value of the farm will have increased 50 per cent.

“The rents of leasehold property have been doubled where the land was of a medium quality ; and, in case of lands specially adapted to the beet, the rents have been quadrupled.”

M. Spineux, another cultivator and manufacturer, belonging to the Department of the Somme, tells the same Com-

mittee, that, "when he took possession of his farm of 350 acres, he believed that it gave a profit of \$855. On annexing a sugar establishment, he obtained a net profit of \$1,425."

M. Chinchain, of the Department of the Sarthe, testified as follows ;

"He cultivated about 1100 acres, 550 in beets. He procured one hundred bullocks from Poitou, which he fed with pulp and a little straw. His neighbours, struck with the advantages of his cultivation, came and offered to weed his beets for the weeds ; and to dig, clean, and cart them, for the tops. This practice has had the effect of diffusing so much plenty around him, that during the beet harvest butter falls in price at Angiers, four miles from his factory."

It is the general testimony in the neighbourhood of Dunkerque, Valenciennes, and Arras, that real estate has risen 50 per cent. in consequence of the introduction of the beet-sugar culture, and wages in nearly the same proportion.

Let not this statement be passed heedlessly by. An advance of 50 per cent. on the value of farms will soon change the face of a country. Land worth \$20, becomes worth \$30 ; and land worth \$50, becomes worth \$75. It is the same as if money should spontaneously increase in quantity, so as to give the lender, at the end of a few years, a principal of \$150 for \$100, after having regularly yielded him his annual interest.

It has been said, that the opening of the Erie Canal had the same effect upon the real estate in the central and western counties of New York. The beet-sugar culture is better, because it is at the option of every cultivator of enterprise and industry, whether he will have it or not. It is what the canal would be, if every farmer could by his individual exertions bring it by his own door.

Another important view of the beet-sugar culture is, the benefit which it confers upon the soil, by clearing, dividing, and fertilizing it. It follows without exhausting, and is one of the best preparations for wheat and other grain crops. In a country like France, where seventeen millions of acres, one fourth of the arable land, lie fallow all the time, the use of this culture, as a substitute for fallows, is a matter of no slight importance.

To consider, then, the beet-sugar business merely in its manufacturing aspect, leaving out all these rich results, or to

bring as an argument against it some derangement of commerce and revenue, which will of course result from any considerable change, be it beneficial or otherwise, is to entertain a contracted and deceptive view of the subject. We readily concede that, considered as a manufacturing business, without giving any additional agricultural profits, or connecting itself with any agricultural improvements, it is not yet proved, that it would be profitable ; but that it is highly so, when the manufacture is made subsidiary to agriculture, and fills up the inactive season of the northern winter, we confidently believe, and do not expect any intelligent man to deny. Suppose, however, it should be found, that the pulp is worth, for paper-making, five times its value as food for animals ; or that the processes and machinery of the manufacture should be so perfected, that the *ten or ten and a half* per cent. of saccharine matter, known to exist in the beet, should be extracted and crystallized ? In either of these cases, beet-sugar making would be very profitable, as a purely manufacturing concern. Now we feel authorized to say, that neither of these improvements is any longer hypothetical. In England, Mr. Kyan, the inventor of the method of preserving timber from the ravages of dry rot, has obtained a patent for making paper of beet-roots, after the juice is expressed. We have seen several specimens of a firm and durable wrapping paper, made of this new material. We are informed, that good printing paper has been made principally of the same substance ; and it is confidently expected, that fine writing paper will be produced. The extensive and increasing demand for paper, and the immense commerce now carried on in rags, are sufficient proof of the importance of this application of the beet-root pulp.

It is well known to those who have attended to the progress of this business in France, that the profits of the principal manufacturers have been much absorbed by a desire, probably too earnest, to keep up with the improvements of machinery. Much has likewise been lost in unproductive experiments. It would be ungrateful and ungracious to find fault with our French friends on this account ; since they have carried the business through the natural and necessary period of infancy, at their exclusive cost, for the common benefit of mankind. They have all along been conscious, that they were obtaining from the beet but little more than

half its saccharine matter. This conviction has naturally and very properly caused a restlessness, and a striving after something more perfect. It is certain, that those who have resisted all innovation, and adhered to the original methods and machinery, have been the most successful; but, if all had been equally cautious, little improvement would have been made, and the nation and mankind would have been at a remoter period, and in a less degree, benefited. Nevertheless, we fully believe, that the cotton manufactory has never been established in any country with so few failures, and so little loss and fluctuation, as the beet-sugar business in France, and other countries of the Continent.

But we may now safely assert, that the great desideratum which the French manufacturers of beet sugar have always felt, and have been striving to supply, is at length attained; that a method has been discovered by which the beet is deprived of all its saccharine, be the same more or less, and that this matter is obtained and operated upon in such a manner as to be nearly all in a crystallizable state. Hitherto, about 50 per cent. of the saccharine has resulted in molasses. This residuum is of comparatively small value; and every thing which arrests the formation of it, adds by so much to the deposite of sugar, and to the profits of the proprietor.

Mr. Schuzenbach, a chemist of Carlsruhe, in the Grand Duchy of Baden, is the author of this important improvement. Having obtained his result in the laboratory, he communicated it to distinguished capitalists in Baden, who thereupon formed a company; not with a view, in the first instance, of erecting a manufactory upon the new system, but merely of proving its pretensions. To this end, they advanced a considerable sum for setting up experimental works so large, that the thing could be tried on a manufacturing scale. Having done this at Ettingen, near Carlsruhe, they appointed a scientific and practical Commission to follow closely the experiments which Mr. Schuzenbach should make. Commissioners from the governments of Wurtemberg and Bavaria likewise attended. The experiments were carried on during five or six weeks, in which time several thousand pounds of sugar, of superior grain and purity, were produced.

The Baden company were so well satisfied with the Report of the Commission, that they immediately determined

to erect an immense establishment, at an expense of more than \$200,000 for fixtures only. A like sum was devoted to the current expenses of the works. Factories were simultaneously erected at or near Munich, Stuttgart, and Berlin. The arrangements were made with remarkable intelligence and caution ; and we cannot doubt, that the new method will prove of immense importance to the prosperity, comfort, and improvement of the northern nations and colonies of the Old World and the New.

ART. VI. — *La Chute d'un Ange ; Episode*. Par ALPHONSE DE LAMARTINE. Bruxelles. 1838.

THIS work, like "Jocelyn," is an episode in a poem on a large scale, the composition of which has occupied many years of Lamartine's life, and which, in design, he justly calls "immense." It was the favorite scheme of his youth, and continues to be the labor of his advanced age. In his view, the period of epic poetry has gone by. It was the form in which the poetic spirit clothed itself in the infancy of nations, before the birth of criticism, when history was blended with fable, and the bards were the chroniclers of great events. In modern times the individualities, that constituted the interest and charm of the epopee, are merged in truths of wider range. The illusion of imagination is broken. The poet sways the mind of his reader by a power of another kind. The sphere of human vision is enlarged by the influence of philosophy and religion. Man perceives "that he constitutes only an imperceptible part of a vast and various whole ; that the work of perfecting his nature is a comprehensive and eternal work." Men now interest themselves in whatever pertains to the race. In a word, the epopee is no longer national or heroic, but cosmopolitan, or, as Lamartine expresses it, *humanitaire*.

Our author's great poem is constructed on this plan. His epic, he tells us, is adapted not only to present time and place, but to the world, and to the future. It is accordingly founded upon a subject which, embodying human thought in all its stages, permits the poet to be at the same time local and